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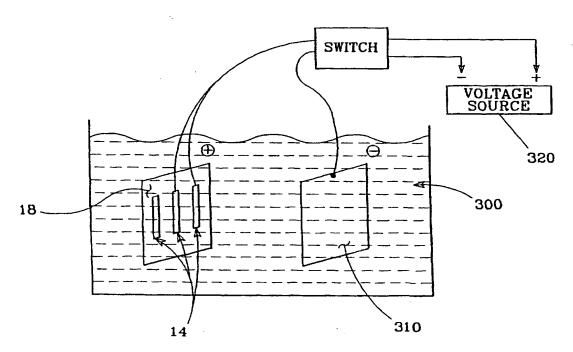
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(54) Title: PATTERNING OF POLYMER LIGHT EMITTING DEVICES USING ELECTROCHEMICAL POLYMERIZATION



(57) Abstract: Light emitters are formed and patterned on an electrode for an organic light-emitting device by electrochemically polymerizing a monomer across the full length of the electrode. A second electrode is deposited so to define a pixel region between mutually aligned portions of the two electrodes. Electroluminescence of the emitter occurs when a voltage is applied across the electrodes of the device.

In TERNATIONAL SEARCH REPORT

Inte. .ional Application No PCT/US 01/07176

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A. CLASSIF IPC 7	CATION OF SUBJECT MATTER H01L27/15 H01L51/40			
According to	international Patent Classification (IPC) or to both national classifical	ion and IPC		
B. FIELDS S	EARCHED			
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Electronic da	ta base consulted during the international search (name of data bas	e and, where practical, search terms used)		
EPO-Int	ernal, PAJ, COMPENDEX, WPI Data			
C. DOCUME	NTS CONSIDERED TO BE RELEVANT		Coloures to plaim No.	
Category °	Citation of document, with indication, where appropriate, of the rele	evant passages	Relevant to claim No.	
χ	PATENT ABSTRACTS OF JAPAN vol. 1995, no. 06,		1,18-20, 28-30	
	31 July 1995 (1995-07-31) -& JP 07 073969 A (CASIO COMPUT C 17 March 1995 (1995-03-17)	O LTD),		
A	abstract		2-17, 21-27, 31-35	
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A docum	ent defining the general state of the art which is not	*T* later document published after the inte or priority date and not in conflict with cited to understand the principle or the	the application but	
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ntion) DOCUMENTS CONSIDERED TO BE RELEVANT	Relevant to claim No.
Citation of document, with indication, where appropriate, or the relevant passages	
INAOKA SEIJI ET AL: "Patterning and electrochemical deposition of conjugated and conducting polymers in organic light-emitting diodes" THE SAN FRANCISCO MEETING; SAN FRANCISCO, CA, USA MAR 26-MAR 31 2000, vol. 41, no. 1, 2000, pages 808-809, XP001028579 Am Chem Soc Polym Prepr Div Polym Chem; American Chemical Society, Polymer Preprints, Division of Polymer Chemistry 2000 ACS, Washington, DC, USA	1,18,34
the whore document	2-17, 19-33,35
DAMLIN P ET AL: "LIGHT-EMITTING DIODES OF POLY(P-PHENYLENE VINYLENE) FILMS ELECTROCHEMICALLY POLYMERIZED BY CYCLIC VOLTAMMETRY ON ITO" SYNTHETIC METALS, ELSEVIER SEQUOIA, LAUSANNE, CH, vol. 102, no. 1-3, PART 2, 12 July 1999 (1999-07-12), pages 947-948, XP001028075 ISSN: 0379-6779	1,18
the whole document	2-17, 19-35
OSTERGARD T ET AL: "Electrochemically prepared light-emitting diodes of poly(para-phenylene)" THIN SOLID FILMS, ELSEVIER-SEQUOIA S.A. LAUSANNE, CH, vol. 311, no. 1-2, 31 December 1997 (1997-12-31), pages 58-61, XP004121320 ISSN: 0040-6090	1,18
	2-17, 19-35
	INAOKA SEIJI ET AL: "Patterning and electrochemical deposition of conjugated and conducting polymers in organic light-emitting diodes" THE SAN FRANCISCO MEETING; SAN FRANCISCO, CA, USA MAR 26-MAR 31 2000, vol. 41, no. 1, 2000, pages 808-809, XP001028579 Am Chem Soc Polym Prepr Div Polym Chem; American Chemical Society, Polymer Preprints, Division of Polymer Chemistry 2000 ACS, Washington, DC, USA the whole document DAMLIN P ET AL: "LIGHT-EMITTING DIODES OF POLY(P-PHENYLENE VINYLENE) FILMS ELECTROCHEMICALLY POLYMERIZED BY CYCLIC VOLTAMMETRY ON ITO" SYNTHETIC METALS, ELSEVIER SEQUOIA, LAUSANNE, CH, vol. 102, no. 1-3, PART 2, 12 July 1999 (1999-07-12), pages 947-948, XP001028075 ISSN: 0379-6779 the whole document OSTERGARD T ET AL: "Electrochemically prepared light-emitting diodes of poly(para-phenylene)" THIN SOLID FILMS, ELSEVIER-SEQUOIA S.A. LAUSANNE, CH, vol. 311, no. 1-2, 31 December 1997 (1997-12-31), pages 58-61, XP004121320 ISSN: 0040-6090 the whole document

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IN RNATIONAL SEARCH REPORT

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PCT/US 01/07176

C.(Continua	ation) DOCUMENTS CONSIDERED TO BE RELEVANT	Relevant to claim No.
Category °	Citation of document, with indication, where appropriate, of the relevant passages	nelevant to claim No.
A	LARMAT FERNANDO ET AL: "Comparative reactivity of thiophene and 3,4-(ethylenedioxy)thiophene as terminal electropolymerizable units in bis-heterocycle arylenes" J POLYM SCI PART A; JOURNAL OF POLYMER SCIENCE, PART A: POLYMER CHEMISTRY DEC 1997 JOHN WILEY & SONS INC, NEW YORK, NY, USA, vol. 35, no. 17, December 1997 (1997-12), pages 3627-3636, XP002178827 cited in the application the whole document	1-35
A	SOTZING G.A. ET AL: "Multiply colored electrochromic carbazole-based polymers" CHEMISTRY OF MATERIALS., vol. 9, 1997, pages 1578-1587, XP002178828 AMERICAN CHEMICAL SOCIETY, WASHINGTON., US ISSN: 0897-4756 cited in the application the whole document	1-35
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INT_INATIONAL SEARCH REPORT

nformation on patent family members

Inte. ional Application No PCT/US 01/07176

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Patent document ted in search report	Publication date	Patent family member(s)	Publication date
IP 07073969 A	17-03-1995	NONE	
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